

### Claims

1. An apparatus for removing a barrier layer from a semiconductor wafer comprising a buffing assembly, at least one buff pad, a slurry delivery system, and an endpoint detection system.

2. The apparatus of Claim 1, wherein the slurry delivery system comprises one or more slurries which may be delivered separately or together.

3. The apparatus of Claim 2, wherein the slurry used is chemically reactive to the barrier layer.

4. The apparatus of Claim 1, wherein the endpoint detection system is comprised of an optical detection system.

5. The apparatus of Claim 1, wherein the endpoint detection system is comprised of an infra red detection system.

6. The apparatus of Claim 1, wherein the endpoint detection system is comprised of a laser detection system.

7. The apparatus of Claim 1, wherein the endpoint detection system is comprised of a motor current detection system.

8. A method for processing a surface of a semiconductor wafer comprising the steps of:

a) removing a material layer overlying a barrier layer from the wafer surface at a primary polishing station with a primary polishing pad; and

b) removing the barrier layer from the wafer surface at a buff station using a set of buff station parameters.

9. The method of claim 8, further comprising the step of buffing the wafer surface after barrier layer removal.

10. The method of claim 9, wherein a set of buff station parameters may be different for the barrier layer removal step than for the buffing step.

11. The method of claim 8, wherein a different slurry composition is used for the barrier layer removal step than for the buffing step.

12. The method of claim 8, further comprising the step of detecting when the material layer is substantially removed from the wafer surface.

13. The method of claim 8, further comprising the step of detecting a point at which barrier layer removal is substantially complete.

14. The apparatus of claim 13, wherein the step of detecting a point at which barrier layer removal is substantially complete is accomplished using an endpoint detection system.

15. The apparatus of Claim 14, wherein the endpoint detection system is comprised of an optical detection system.

16. The apparatus of Claim 14, wherein the endpoint detection system is comprised of an infra red detection system.

17. The apparatus of Claim 14, wherein the endpoint detection system is comprised of a laser detection system.

18. The apparatus of Claim 14, wherein the endpoint detection system is comprised of a motor current detection system.

19. The method of claim 8 further comprising the step of conditioning the buff station pads.

20. The method of claim 19 wherein the conditioning step is accomplished by pressing a lower buff pad against an upper buff pad and rotating each pad at a different velocity.

21. The method of claim 19, wherein the pad conditioning step is performed between each wafer being processed.

22. The method of claim 19, wherein the pad conditioning step is performed between intermittent wafers being processed.

23. The method of claim 8, wherein the material layer is comprised of aluminum, copper, or tungsten.

24. The method of claim 8, wherein the barrier layer is comprised of Ti, TiN, Ta, or TaN.

25. The method of claim 8, further comprising the step of:

- c) supplying a first polishing slurry to the primary polishing station; and
- d) supplying one or more different polishing slurries to the buff station.